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Residential, Commercial, and Industrial Sector GHG Reduction Policy Options Prepared for TWG Meeting #4, October 27, 2005

Potential Emission Reductions *	Potential Cost or Cost Savings *
High (H): At least 1 Million Metric Tons (MMT) carbon dioxide equivalent (CO_2e) per year by 2020 (~1% of current NM emissions)	**High (H)**: $50 per Metric Ton CO_2e ($MTCO_2e$) or above
Medium (M): From 0.1 to 1 MMT CO_2e per year by 2020	**Medium (M):** \$5-50/$MTCO_2e$
Low (L): Less than 0.1 MMT CO_2e per year by 2020	**Low (L):** Less than \$5/$MTCO_2e$
Uncertain (U): Not able to estimate at this time	**Cost Savings**: Options that save money, i.e., that have "negative costs."
	Uncertain (U): Not able to estimate at this time

***** "Potential" here connotes rough initial estimate based in part on experience in other states. Also, several measures may overlap in terms of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures.

Definition of Priorities for Analysis:

- **High:** High priority options will be analyzed first.
- **Medium:** Medium priority options will be analyzed next, time and resources permitting.
- **Low**: Low priority options will be analyzed last, time and resources permitting.
- **"TBD"**: Still to be determined by the TWG

**** Options marked with a double asterisk (**) indicate options that are at least partially "base case" policies, i.e., that have been or will be implemented at some level in Arizona. Please see http://www.azclimatechange.us/ewebeditpro/items/O40F6847.pdf for an initial, non-comprehensive sampling of such policies as they relate to the policy option categories listed below.**

Comments or priorities highlighted in yellow were discussed and affirmed during the Arizona Climate Change Advisory Group (CCAG) Meeting on September 29, 2005. CCAG meeting summary is posted at **http://www.azclimatechange.us/template.cfm?FrontID=4670**

Option No.	GHG Reduction Policy Option	Priority for Analysis	Potential GHG Emissions Reductions	Potential Cost or Cost Savings	Ancillary Impacts, Feasibility Considerations	Notes
1.	**Energy Efficiency Programs, Funds, and Goals**					
1.1	Utility Demand Side Management (DSM) Programs for electricity, natural gas, propane, fuel oil**	High	High	Cost Savings/ Low Cost	Co-benefits include transmission/distribution system costs reduction. Significant potential overlap with many other options.	
1.2	Energy Efficiency Funds (e.g. Public Benefit Funds) administered by State agency, utility, or 3rd party (e.g. Energy Trust)	High	High	Cost Savings/ Low Cost	[As above]	
1.3	Energy Efficiency Requirements (e.g. Utility Savings Goals or Energy Portfolio Standards)	High	High	Cost Savings/ Low Cost	[As above]	
1.4	Market transformation and technology development programs**	High	High	Cost Savings/ Low Cost		
2.	**Appliance Standards**					
2.1	Expansion of State-level Appliance Efficiency Standards**	High	Low-High	Cost Savings/ Low Cost	Feasibility enhanced by ongoing effort to adopt California standards	
2.2	Support for Federal-level Appliance Efficiency Standards	High	Low-High	Cost Savings/ Low Cost	Potential overlap with previous option	

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3.	**Buildings**					
3.1	Improved Building Codes**	High	High	Cost Savings/ Low Cost	Potential to also yield water savings, comfort/air quality improvements. Code changes advanced in some localities, beginning in others.	
3.2	Promotion and Incentives for Improved Design and Construction (e.g. LEED, green buildings) **	High	Medium/ High	Cost Savings/ Low Cost	Potential overlap with previous option. Also overlap with technology-specific options, and other building-related options. Co-benefits as above, plus urban design, market transformation, and other benefits.	Ranked High priority due, in part, to its role as complementary approach to building codes, which set a compulsory minimum, whereas LEED-type activities are voluntary.
3.3 (prev. 3.3-3.6)	Training and Education Programs and Certification for Building Planners, Builders/Contractors, Energy Managers and Operators, and Local Officials**	Medium/ High	Medium	Cost Savings/ Low Cost		Some overlap with previous options in Buildings category, and also highly complementary to those options.
3.4 (prev. 3.7)	Increased use of blended cement (substituting fly ash or other pozzolans for clinker reduces CO2 emissions)	Low	Low/ Medium	Cost Savings/ Low Cost	May provide modest avoided waste disposal co-benefit, depending on standard practice	
3.5 (prev. 3.8)	Reduction of emissions from diesel engines used in new construction developments	Low	Low	Low Cost		Ranked low since there are practical issues associated with providing sufficient sets of temporary switchgear at the times and places they are needed to serve a significant portion of an extremely active building market with grid electricity.

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4.	**Education and Outreach**					
4.1 (old 2.1.1)	Consumer education programs**	Medium/ High	?	Cost Savings/ Low Cost	Potential contribution difficult to estimate	
4.2 (old 2.3.3)	Introduce in School Curriculum**	Medium/ High	?	Cost Savings/ Low Cost	Potential contribution difficult to estimate	Ranked Medium/High because this option is recognized as an important effort with results that will accrue over the longer-term.
5.	**Pricing and Purchasing**					
5.1	Green Power Purchasing Offers to Consumers beyond Green Power Included in Utility RPS**	Low	?	Medium/ High Cost	Interaction with RPS option	Low priority since utility adherence to an RPS of green power purchase (EG expanded EPS) considered more effective than voluntary offers to consumers. CCAG suggested that the priority should be reconsidered.
5.2	Bulk Purchasing Programs for Energy Efficiency or other Equipment (Public or Private sector)	Low	Low/ Medium	Cost Savings/ Low Cost	May interact with utility programs.	
5.3	Net-metering policies	Medium/ High (CCAG ranked High)	Medium	Cost Savings/ Low Cost	Potential changes in emissions set at medium level, but note that achieving M level of reductions may take time.	Medium/High priority since it will have substantial impact on uptake of both renewable energy technologies (solar PV) and combined heat and power. (See note on TOU rates below.)
5.4	Time of Use (TOU) Rates**	Medium/ High	Medium	Cost Savings/ Low Cost	Potential changes in emissions set at medium level, but note that achieving M level of reductions may take time	Significant utility system co-benefits (transmission and distribution system). Would also significantly interact with and increase effectiveness of net metering policies.

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6.	**Technology Specific Policies**					
6.1	Incentives for Renewable Energy Applications (Solar roofs, water heaters, etc.)**	Medium (CCAG ranked High)	High	Medium/ High Cost	Programs could help to lower capital and installation costs.	Ranked as Medium Priority because incentive and other programs are already underway at utility, state levels.
6.2	Clean Combined Heat and Power AG suggested that distributed generation be included here. [Note from CCS--TWG may also want to include here or elsewhere combined heating, cooling and power here, as well as power generation from waste heat]	High	High	Cost Savings – Medium Cost	Cost dependent on price of natural gas; interconnection an issue; utility system co-benefits. Note interaction with TOU rates and Net Metering policies.	
6.3	Promotion and Tax or Other Incentives for ENERGY STAR and better appliances and equipment**	Medium/ High (CCAG ranked High)	High	Cost Savings/ Low Cost	Interaction with appliance standards, utility programs.	TWG members suggested restricting the option to ENERGY STAR appliances and equipment
6.4	Appliance Recycling/Pick-Up Programs**	Low	Low	Cost Savings/ Low Cost	Long-term impact uncertain	
6.5	White Roofs, Rooftop Gardens, and Landscaping (including Shade Tree Programs)**	Medium	Medium/ High	Cost Savings/ Low Cost	Results likely to vary substantially with design. If widely implemented may have favorable impact on local climate, for example, nighttime temperatures.	Medium priority because implementation may be difficult. Likely to interact with building options such as LEED (option 3.2). CCAG suggested coverage under Buildings.
6.6	Focus on specific end-uses/technologies: window AC units, lighting, water heating, plug loads, networked PC management, power supplies, motors, pumps, boilers, etc). Consumer products programs, may include incentives, retailer training, marketing and promotion, education, etc **	TBD	(By option, range from Low to High)	Cost Savings/ Low Cost	Interaction with appliance standards, utility programs.	

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7.	**Non-Energy Emissions (HFCs, PFCs, SF6, CO2 process Emissions**					
7.1	Participation in Voluntary Industry-Government Partnerships**	TBD	Uncertain	Cost Savings/ Low Cost		
7.2	Process Changes/ Optimization	TBD	Uncertain	Uncertain	Impact, cost likely highly process-specific.	
7.3	Leak Reduction/Capture, Recovery and Recycling of Process Gases	TBD	Medium	Uncertain		
7.4	Use of Alternative Gases (other HFCs, hydrocarbon coolants, etc.)	TBD	Medium/ High	Low/ Medium Cost		
7.5	Cement Industry: use of alternative fuels	TBD	Uncertain	Low/ Medium Cost		
8.	**GHG Emissions-Specific Goals and Policies**					
8.1	Support for switching to less carbon-intensive fuels (coal and oil to natural gas or biomass)**	TBD	Medium/ High	Cost Savings – Medium Cost	Cost dependent on relative fuel prices	
8.2	Industry-Specific Emissions Cap and Trade Programs	TBD	Medium/ High	Low/ Medium Cost	Highly dependent on specification of trading systems	
8.3	Voluntary emissions targets**	TBD	Uncertain	Uncertain		
8.4	Negotiated Emissions or Energy Savings Agreements	TBD	Uncertain	Uncertain		

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9.	**Other**					
9.1	Government Agency Requirements and Goals (including procurement)**	TBD	Uncertain	Cost Savings/ Low Cost	Potential overlap with other options	
9.2	Focus on specific market segments: existing homes (weatherization), new construction, apartments, low income, etc.**	TBD	Medium/ High	Cost Savings/ Low Cost	Potential overlap with other options	
9.3	Reinvestment Fund**	TBD	Uncertain	Cost Savings/ Low Cost	Potential overlap with other options	
9.4	Municipal Energy Management**	TBD	Uncertain	Uncertain	Potential overlap with other options	
9.5	Focus on Small and Medium Enterprises (SMEs)**	TBD	Uncertain	Uncertain	Potential overlap with other options	
9.6	Industrial ecology/ by-product synergy	TBD	Uncertain	Uncertain		
10.	**Solid Waste and Wastewater Management**					
10.1	Solid Waste Source Reduction	TBD	Medium/ High	Uncertain		
10.2	Solid Waste Recycling	TBD	High	Uncertain	Materials recovery, reduction of energy requirements for raw materials production	
10.3	Separation and Composting of Organic Materials in Solid Wastes	TBD	Uncertain	Uncertain	Co-production of soil amendments	
10.4	Capture/Use in buildings or industry of Methane from Landfills	TBD	Uncertain	Uncertain	Fossil fuel displacement a co-benefit	
10.5	Capture/Use of Methane from Wastewater Treatment	TBD	Uncertain	Uncertain	Fossil fuel displacement a co-benefit	